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<110> BORRELLI, MICHAEL J.

<120> METHODS AND COMPOSITIONS FOR HEAT ACTIVATED GENE THERAPY USING CYTOLETHAL DISTENDING TOXIN

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 gcggggtcgg ggaggtgcaa aaggatgaaa agcccgtgga agcggagctg agcagatccg 120
 agccgggctg gcggcagaga aaccgcaggg agagcctcac tgctgagcgc ccctcgacgg 180
 cggagcggca gcagcctccg tggcctccag catccgacaa gaagcttcag ccatgcaggc 240
 cccacgggag ctcgcggtgg gcatcgacct gggcaccacc tactcgtgcg tggcgtgtt 300
 tcagcaggc cgctggaga tcctggccaa cgaccaggc aaccgcacca cgcccagcta 360
 cgtggcctc accgacaccg agcggctggt cggggacgcg gccaagagcc aggccggccct 420
 gaacccccac aacaccgtgt tcgatgccaa gcggctgatc gggcgaagt tcgcggacac 480
 cacggtgca gtcggatca agcaactggcc cttccagggtg gtgagcggg gggcaagcc 540
 caaggtgcgc gtatgttacc gccccgggaa caagacgtt tacccggagg agatctcg 600
 catggtgctg agcaagatga aggagacggc cgaggcgtac ctggccagc ccgtaaagca 660
 cgcagtgtac accgtgcccc cctatttcag taactcgcag cgccaggcca ccaaggacgc 720
 gggggccatc gcggggctca aggtgctgc gatcatcaat gaggccacgg cagcagccat 780
 cgcctatggg ctggaccggc gggcgggg aaagcgcac gtcgtcatt ttgacctggg 840
 tgggggcacc ttcgatgtgt cggttcttc cattgacgcc ggtgttttgg aggtgaaagc 900
 cactgctgga gataaccacc ttggaggaga ggacttcgac aaccggctcg tgaaccactt 960
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 caggctgcgc acagcctgtg agcgcgcac ggcgcaccccg tcctcagca cccaggccac 1080
 cctggagata gactccctgt tcgagggcgt ggacttctac aagtccatca ctgcgtcccg 1140
 ctggaggaa ctgtgctca acctttccg cagcaccctg gagccggtgg agaaggccct 1200
 gcgggatgcc aagctggaca aggcccagat tcatgactt tccttggggg gagggctcca 1260
 ctcgcatccc caaggtgcag aagtgtctgc aggacttctt caacggcaag gagctgaaca 1320
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 ccaccaagca gacccagact ttcaccaccc actcggacaa ccagcttggg gtcttcatcc 1560
 aggtgtatga ggttgaggg gccatgacca aggacaacaa cctgtgggg cgtttgaac 1620
 tcattggcat ccctcctgccc ccacatggag tccccccagat agaggtgacg ttgcatttgc 1680
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 agggccatgt ctccatgtt aaagggttctt tgcaagaggg aagccttagg gacaagattc 1920
 ccgaagagga caggcgcaaa gtcaagaca agtgtcaggatc agtccttgc tggctggagc 1980
 acaaccagct ggcagagaag gaggaggatg agcatcagaa gagggagctg gagcaaattt 2040
 gtcgccttccat ctctccagg ctctatgggg ggcctgggtt ccctggggc agcagttgtt 2100
 ggcgtcaagc ccaccagggg gaccccgca ccggcccccattt cattgaggag gttgattgaa 2160
 tggcccttcg tgataagtca gctgtactg tcagggttat gctatggcc ttctagactg 2220
 tcttctatga tcctgcccattt cagatgaa gggcttgggg gggcttccccc tccaaagctt 2280
 gaacttctt tccaggatattt ctgaagtctt ttgactttttt ggggggggggg cggttcatcc 2340
 tcttctgctt caaataaaaaa gtcatatattt tattaaaact tgcgtggcac ttaacattt 2400
 ctttcaccta tattttgtgtt attttggatc ttgtatgtat gaattttgtt atgtaaaata 2460
 tagttataga cctaaataaa cttttaaaac tcc 2493

<210> 8
 <211> 643
 <212> PRT
 <213> Homo sapiens

<400> 8
 Met Gln Ala Pro Arg Glu Leu Ala Val Gly Ile Asp Leu Gly Thr Thr
 1 5 10 15

Tyr Ser Cys Val Gly Val Phe Gln Gln Gly Arg Val Glu Ile Leu Ala
 20 25 30

Asn Asp Gln Gly Asn Arg Thr Thr Pro Ser Tyr Val Ala Phe Thr Asp
 35 40 45

Thr Glu Arg Leu Val Gly Asp Ala Ala Lys Ser Gln Ala Ala Leu Asn
 50 55 60

Pro His Asn Thr Val Phe Asp Ala Lys Arg Leu Ile Gly Arg Lys Phe
 65 70 75 80

Ala Asp Thr Thr Val Gln Ser Asp Met Lys His Trp Pro Phe Arg Val
 85 90 95

Val Ser Glu Gly Gly Lys Pro Lys Val Arg Val Cys Tyr Arg Gly Glu
 100 105 110

Asp Lys Thr Phe Tyr Pro Glu Glu Ile Ser Ser Met Val Leu Ser Lys
 115 120 125

Met Lys Glu Thr Ala Glu Ala Tyr Leu Gly Gln Pro Val Lys His Ala
 130 135 140

Val Ile Thr Val Pro Ala Tyr Phe Asn Asp Ser Gln Arg Gln Ala Thr
 145 150 155 160

Lys Asp Ala Gly Ala Ile Ala Gly Leu Asn Val Leu Arg Ile Ile Asn
 165 170 175

Glu Pro Thr Ala Ala Ala Ile Ala Tyr Gly Leu Asp Arg Arg Gly Ala
 180 185 190

Gly Glu Arg Asn Val Leu Ile Phe Asp Leu Gly Gly Gly Thr Phe Asp
 195 200 205

Val Ser Val Leu Ser Ile Asp Ala Gly Val Phe Glu Val Lys Ala Thr
 210 215 220

Ala Gly Asp Thr His Leu Gly Gly Glu Asp Phe Asp Asn Arg Leu Val
 225 230 235 240

Asn His Phe Met Glu Glu Phe Arg Arg Lys His Gly Lys Asp Leu Ser
 245 250 255

Gly Asn Lys Arg Ala Leu Arg Arg Leu Arg Thr Ala Cys Glu Arg Ala
 260 . 265 270

Lys Arg Thr Leu Ser Ser Ser Thr Gln Ala Thr Leu Glu Ile Asp Ser
 275 280 285

Leu Phe Glu Gly Val Asp Phe Tyr Thr Ser Ile Thr Arg Ala Arg Phe
 290 295 300

Glu Glu Leu Cys Ser Asp Leu Phe Arg Ser Thr Leu Glu Pro Val Glu
 305 310 315 320

Lys Ala Leu Arg Asp Ala Lys Leu Asp Lys Ala Gln Ile His Asp Val
 325 330 335
 Val Leu Val Gly Gly Ser Thr Arg Ile Pro Lys Val Gln Lys Leu Leu
 340 345 350
 Gln Asp Phe Phe Asn Gly Lys Glu Leu Asn Lys Ser Ile Asn Pro Asp
 355 360 365
 Glu Ala Val Ala Tyr Gly Ala Ala Val Gln Ala Ala Val Leu Met Gly
 370 375 380
 Asp Lys Cys Glu Lys Val Gln Asp Leu Leu Leu Asp Val Ala Pro
 385 390 395 400
 Leu Ser Leu Gly Leu Glu Thr Ala Gly Gly Val Met Thr Thr Leu Ile
 405 410 415
 Gln Arg Asn Ala Thr Ile Pro Thr Lys Gln Thr Gln Thr Phe Thr Thr
 420 425 430
 Tyr Ser Asp Asn Gln Pro Gly Val Phe Ile Gln Val Tyr Glu Gly Glu
 435 440 445
 Arg Ala Met Thr Lys Asp Asn Asn Leu Leu Gly Arg Phe Glu Leu Ser
 450 455 460
 Gly Ile Pro Pro Ala Pro Arg Gly Val Pro Gln Ile Glu Val Thr Phe
 465 470 475 480
 Asp Ile Asp Ala Asn Gly Ile Leu Ser Val Thr Ala Thr Asp Arg Ser
 485 490 495
 Thr Gly Lys Ala Asn Lys Ile Thr Ile Thr Asn Asp Lys Gly Arg Leu
 500 505 510
 Ser Lys Glu Glu Val Glu Arg Met Val His Glu Ala Glu Gln Tyr Lys
 515 520 525
 Ala Glu Asp Glu Ala Gln Arg Asp Arg Val Ala Ala Lys Asn Ser Leu
 530 535 540
 Glu Ala His Val Phe His Val Lys Gly Ser Leu Gln Glu Glu Ser Leu
 545 550 555 560
 Arg Asp Lys Ile Pro Glu Glu Asp Arg Arg Lys Met Gln Asp Lys Cys
 565 570 575
 Arg Glu Val Leu Ala Trp Leu Glu His Asn Gln Leu Ala Glu Lys Glu
 580 585 590
 Glu Tyr Glu His Gln Lys Arg Glu Leu Glu Gln Ile Cys Arg Pro Ile
 595 600 605
 Phe Ser Arg Leu Tyr Gly Gly Pro Gly Val Pro Gly Gly Ser Ser Cys
 610 615 620

Gly Thr Gln Ala Arg Gln Gly Asp Pro Ser Thr Gly Pro Ile Ile Glu
625 630 635 640

Glu Val Asp

<210> 9
<211> 968
<212> DNA
<213> Homo sapiens

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<400> 9
cccgccccggg cgggcgggag gctctcgact gggcgggaag gtgcgggaag gttcgccgc 60
gcgggggtcgg ggaggatgcaa aaggataaaa agccccgtgga cgagactgtag cagatccgc 120
cgggctggcg gcagagaaaac cgcaggagaa gctcaactgc tgagcgcggg tcgacgcggg 180
cggcagcagc ctccgtggcc tccagcatcc gacaagaagc ttcaagccatg caggccccac 240
gggagctcgc ggtgggcata gacctaggca ccacctaactc gtgcgtggc gtcttcagc 300
agggacgcgt ggagatccta gccaacgacc aaggcaaccc caccacgccc agctacgtgg 360
ccttcaccga caccgagcgg ctggtcggg acgcggccaa gaaccaggcg gccctgaacc 420
cccacaacac cgtgttgcgtat gccaagcggc tgatcgggcg caagttcgcg gacaccacgg 480
tgcagtccga tatgaagcac tggcccttca aggtggtgag cggaggcggc aagcccaagg 540
tgcgcgtat ctaccgcggg gaggacaaga ctttctacc cggaggatgc tgcgtccatgg 600
tgctgaccaa gatgaaggag acggccgagg ctttgcgttgg ccagccccgtg aagcacgcag 660
tgatcaccgt gcccacatat ttcaact cgcagcgcca agccaccaag gacgcggggg 720
ccatcgccgg gctcaagggtg ctggcgatca tcaatgaggc cacggcagca gccatcgcc 780
atgggcttggc ccggcggcgc gcgggaaagc gcaacgtgtc catttttgac ttgggtgggg 840
gcaccttcga tgtgtcggtt ctcaccattg acgcccgtgt ctggaggtg aaagccactg 900
ctggagatac ccacattggg ggagaggact tcgacaaccc gctcgtgaac cacttcatgg 960
aagaattc

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<210> 10
<211> 223
<212> PRT
<213> Haemophilus ducreyi
```

<400> 10
Met Lys Lys Phe Leu Pro Ser Leu Leu Leu Met Gly Ser Val Ala Cys
1 5 10 15

Ser Ser Asn Gln Arg Met Asn Asp Tyr Ser Gln Pro Glu Ser Gln Ser
20 25 30

Asp Leu Ala Pro Lys Ser Ser Thr Ile Gln Pro Gln Pro Gln Pro Leu
35 40 45

Leu Ser Lys Thr Pro Ser Met Ser Leu Asn Leu Leu Ser Ser Ser Gly
50 55 60

Pro Asn Arg Gln Val Leu Pro Ser Glu Pro Ser Asn Phe Met Thr Leu
65 70 75 80

Met Gly Gln Asn Gly Ala Leu Leu Thr Val Trp Ala Leu Ala Lys Arg
85 90 95

Asn Trp Leu Trp Ala Tyr Pro Asn Ile Tyr Ser Gln Asp Phe Gly Asn
 100 105 110

Ile Arg Asn Trp Lys Met Glu Pro Gly Lys His Arg Glu Tyr Phe Arg
 115 120 125
 Phe Val Asn Gln Ser Leu Gly Thr Cys Val Glu Ala Tyr Gly Asn Gly
 130 135 140
 Leu Ile His Asp Ile Cys Ser Leu Asp Lys Leu Ala Gln Glu Phe Glu
 145 150 155 160
 Leu Leu Pro Thr Asp Ser Gly Ala Val Val Ile Lys Ser Val Ser Gln
 165 170 175
 Gly Arg Cys Val Thr Tyr Asn Pro Val Ser Thr Thr Phe Tyr Ser Thr
 180 185 190
 Val Thr Leu Ser Val Cys Asp Gly Ala Thr Glu Pro Ser Arg Asp Gln
 195 200 205
 Thr Trp Tyr Leu Ala Pro Pro Val Leu Glu Ala Thr Ala Val Asn
 210 215 220

 <210> 11
 <211> 283
 <212> PRT
 <213> Haemophilus ducreyi

 <400> 11
 Met Gln Trp Val Lys Gln Leu Ser Val Val Phe Cys Val Met Leu Phe
 1 5 10 15
 Ser Phe Ser Ser Tyr Ala Asn Leu Ser Asp Phe Lys Val Ala Thr Trp
 20 25 30
 Asn Leu Gln Gly Ser Ser Ala Val Asn Glu Ser Lys Trp Asn Ile Asn
 35 40 45
 Val Arg Gln Leu Leu Ser Gly Glu Gln Gly Ala Asp Ile Leu Met Val
 50 55 60
 Gln Glu Ala Gly Ser Leu Pro Ser Ser Ala Val Arg Thr Ser Arg Val
 65 70 75 80
 Ile Gln His Gly Gly Thr Pro Ile Glu Glu Tyr Thr Trp Asn Leu Gly
 85 90 95
 Thr Arg Ser Arg Pro Asn Met Val Tyr Ile Tyr Tyr Ser Arg Leu Asp
 100 105 110
 Val Gly Ala Asn Arg Val Asn Leu Ala Ile Val Ser Arg Arg Gln Ala
 115 120 125
 Asp Glu Ala Phe Ile Val His Ser Asp Ser Ser Val Leu Gln Ser Arg
 130 135 140
 Pro Ala Val Gly Ile Arg Ile Gly Thr Asp Val Phe Phe Thr Val His
 145 150 155 160

Ala Leu Ala Thr Gly Gly Ser Asp Ala Val Ser Leu Ile Arg Asn Ile
 165 170 175
 Phe Thr Thr Phe Asn Ser Ser Ser Pro Pro Glu Arg Arg Val Tyr
 180 185 190
 Ser Trp Met Val Val Gly Asp Phe Asn Arg Ala Pro Ala Asn Leu Glu
 195 200 205
 Val Ala Leu Arg Gln Glu Pro Ala Val Ser Glu Asn Thr Ile Ile Ile
 210 215 220
 Ala Pro Thr Glu Pro Thr His Arg Ser Gly Asn Ile Leu Asp Tyr Ala
 225 230 235 240
 Ile Leu His Asp Ala His Leu Pro Arg Arg Glu Gln Ala Arg Glu Arg
 245 250 255
 Ile Gly Ala Ser Leu Met Leu Asn Gln Leu Arg Ser Gln Ile Thr Ser
 260 265 270
 Asp His Phe Pro Val Ser Phe Val Arg Asp Arg
 275 280

<210> 12
 <211> 186
 <212> PRT
 <213> Haemophilus ducreyi

<400> 12
 Met Lys Lys Tyr Leu Leu Ser Phe Leu Leu Ile Met Ile Leu Ala Leu
 1 5 10 15
 Ala Ser His Ala Glu Ser Asn Pro Asp Pro Thr Thr Tyr Pro Asp Val
 20 25 30
 Glu Leu Ser Pro Pro Pro Arg Ile Ser Leu Arg Ser Leu Leu Thr Ala
 35 40 45
 Gln Pro Val Lys Asn Asp His Tyr Asp Ser His Asn Tyr Leu Ser Thr
 50 55 60
 His Trp Glu Leu Ile Asp Tyr Lys Gly Lys Glu Tyr Glu Lys Leu Arg
 65 70 75 80
 Asp Gly Gly Thr Leu Val Gln Phe Lys Val Val Gly Ala Ala Lys Cys
 85 90 95
 Phe Ala Phe Leu Gly Lys Gly Thr Thr Asp Cys Lys Asp Thr Asp His
 100 105 110
 Thr Val Phe Asn Leu Ile Pro Thr Asn Thr Gly Ala Phe Leu Ile Lys
 115 120 125
 Asp Ala Leu Leu Gly Phe Cys Ile Thr Ser His Asp Phe Asp Asp Leu
 130 135 140

Lys Leu Glu Pro Cys Gly Gly Ser Val Ser Gly Arg Thr Phe Ser Leu
 145 150 155 160

Ala Tyr Gln Trp Gly Ile Leu Pro Pro Phe Gly Pro Ser Lys Ile Leu
 165 170 175

Ile Pro Pro Val Arg Arg Asn Gln Gly Ser
 180 185

<210> 13
 <211> 268
 <212> PRT
 <213> Campylobacter jejuni

<400> 13
 Met Gln Lys Ile Ile Val Phe Ile Leu Cys Cys Phe Met Thr Phe Phe
 1 5 10 15

Leu Tyr Ala Cys Ser Ser Lys Phe Glu Asn Val Asn Pro Leu Gly Arg
 20 25 30

Ser Phe Gly Glu Phe Glu Asp Thr Asp Pro Leu Lys Leu Gly Leu Glu
 35 40 45

Pro Thr Phe Pro Thr Asn Gln Glu Ile Pro Ser Leu Ile Ser Gly Ala
 50 55 60

Asp Leu Val Pro Ile Thr Pro Ile Thr Pro Pro Leu Thr Arg Thr Ser
 65 70 75 80

Asn Ser Ala Asn Asn Ala Ala Asn Gly Ile Asn Pro Arg Phe Lys
 85 90 95

Asp Glu Ala Phe Asn Asp Val Leu Ile Phe Glu Asn Arg Pro Ala Val
 100 105 110

Ser Asp Phe Leu Thr Ile Leu Gly Pro Ser Gly Ala Ala Leu Thr Val
 115 120 125

Trp Ala Leu Ala Gln Gly Asn Trp Ile Trp Gly Tyr Thr Leu Ile Asp
 130 135 140

Ser Lys Gly Phe Gly Asp Ala Arg Val Trp Gln Leu Leu Tyr Pro
 145 150 155 160

Asn Asp Phe Ala Met Ile Lys Asn Ala Lys Thr Asn Thr Cys Leu Asn
 165 170 175

Ala Tyr Gly Asn Gly Ile Val His Tyr Pro Cys Asp Ala Ser Asn His
 180 185 190

Ala Gln Met Trp Lys Leu Ile Pro Met Ser Asn Thr Ala Val Gln Ile
 195 200 205

Lys Asn Leu Gly Asn Gly Lys Cys Ile Gln Ala Pro Ile Thr Asn Leu
 210 215 220

Tyr Gly Asp Phe His Lys Val Phe Lys Ile Phe Thr Val Glu Cys Ala
 225 230 235 240

 Lys Lys Asp Asn Phe Asp Gln Gln Trp Phe Leu Thr Thr Pro Pro Phe
 245 250 255

 Thr Ala Lys Pro Leu Tyr Arg Gln Gly Glu Val Arg
 260 265

 <210> 14
 <211> 265
 <212> PRT
 <213> Campylobacter jejuni

 <400> 14
 Met Lys Lys Ile Ile Cys Leu Phe Leu Ser Phe Asn Leu Ala Phe Ala
 1 5 10 15

 Asn Leu Glu Asn Phe Asn Val Gly Thr Trp Asn Leu Gln Gly Ser Ser
 20 25 30

 Ala Ala Thr Glu Ser Lys Trp Ser Val Ser Val Arg Gln Leu Val Ser
 35 40 45

 Gly Ala Asn Pro Leu Asp Ile Leu Met Ile Gln Glu Ala Gly Thr Leu
 50 55 60

 Pro Arg Thr Ala Thr Pro Thr Gly Arg His Val Gln Gln Gly Gly Thr
 65 70 75 80

 Pro Ile Asp Glu Tyr Glu Trp Asn Leu Gly Thr Leu Ser Arg Pro Asp
 85 90 95

 Arg Val Phe Ile Tyr Tyr Ser Arg Val Asp Val Gly Ala Asn Arg Val
 100 105 110

 Asn Leu Ala Ile Val Ser Arg Met Gln Ala Glu Glu Val Ile Val Leu
 115 120 125

 Pro Pro Pro Thr Thr Val Ser Arg Pro Ile Ile Gly Ile Arg Asn Gly
 130 135 140

 Asn Asp Ala Phe Phe Asn Ile His Ala Leu Ala Asn Gly Gly Thr Asp
 145 150 155 160

 Val Gly Ala Ile Ile Thr Ala Val Asp Ala His Phe Ala Asn Met Pro
 165 170 175

 Gln Val Asn Trp Met Ile Ala Gly Asp Phe Asn Arg Asp Pro Ser Thr
 180 185 190

 Ile Thr Ser Thr Val Asp Arg Glu Leu Ala Asn Arg Ile Arg Val Val
 195 200 205

 Phe Pro Thr Ser Ala Thr Gln Ala Ser Gly Gly Thr Leu Asp Tyr Ala
 210 215 220

Ile Thr Gly Asn Ser Asn Arg Gln Gln Thr Tyr Thr Pro Pro Leu Leu
 225 230 235 240

Ala Ala Ile Leu Met Leu Ala Ser Leu Arg Ser His Ile Val Ser Asp
 245 250 255

His Phe Pro Val Asn Phe Arg Lys Phe
 260 265

<210> 15
<211> 189
<212> PRT
<213> Campylobacter jejuni

<400> 15
Met Lys Lys Ile Ile Thr Leu Phe Phe Met Phe Ile Thr Leu Ala Phe
 1 5 10 15

Ala Thr Pro Thr Gly Asp Leu Lys Asp Phe Thr Glu Met Val Ser Ile
 20 25 30

Arg Ser Leu Glu Thr Gly Ile Phe Leu Ser Ala Phe Arg Asp Thr Ser
 35 40 45

Lys Asp Pro Ile Asp Gln Asn Trp Asn Ile Lys Glu Ile Val Leu Ser
 50 55 60

Asp Glu Leu Lys Gln Lys Asp Lys Leu Ala Asp Glu Leu Pro Phe Gly
 65 70 75 80

Tyr Val Gln Phe Thr Asn Pro Lys Glu Ser Asp Leu Cys Leu Ala Ile
 85 90 95

Leu Glu Asp Gly Thr Phe Gly Ala Lys Ser Cys Gln Asp Asp Leu Lys
 100 105 110

Asp Gly Lys Leu Glu Thr Val Phe Ser Ile Met Pro Thr Thr Thr Ser
 115 120 125

Ala Val Gln Ile Arg Ser Leu Val Leu Glu Ser Asp Glu Cys Ile Val
 130 135 140

Thr Phe Phe Asn Pro Asn Ile Pro Ile Gln Lys Arg Phe Gly Ile Ala
 145 150 155 160

Pro Cys Thr Leu Asp Pro Ile Phe Phe Ala Glu Val Asn Glu Leu Met
 165 170 175

Ile Ile Thr Pro Pro Leu Thr Ala Ala Thr Pro Leu Glu
 180 185

<210> 16
<211> 33
<212> PRT
<213> Campylobacter jejuni

<400> 16
 Met Leu Thr Trp Gln Gln Ile Tyr Asp Pro Phe Ser Asn Ile Trp Leu
 1 5 10 15
 Ser Ala Leu Val Ala Phe Leu Pro Ile Leu Cys Phe Leu Val Cys Leu
 20 25 30
 Val

<210> 17
<211> 237
<212> PRT
<213> Escherichia coli

<400> 17
 Met Asp Lys Lys Leu Ile Ala Phe Leu Cys Thr Leu Ile Ile Thr Gly
 1 5 10 15
 Cys Ser Asn Gly Ile Gly Asp Ser Pro Ser Pro Pro Gly Lys Asn Val
 20 25 30
 Glu Leu Val Gly Ile Pro Gly Gln Gly Ile Ala Val Thr Ser Asn Gly
 35 40 45
 Ala Thr Pro Thr Leu Gly Ala Asn Asn Thr Glu Phe Pro Glu Val Ser
 50 55 60
 Ile Met Ser Thr Gly Gly Ala Leu Leu Thr Ile Trp Ala Arg Pro Val
 65 70 75 80
 Arg Asn Trp Leu Trp Gly Tyr Thr Pro Phe Asp Ser Val Asn Phe Gly
 85 90 95
 Glu Asn Arg Asn Trp Lys Val Val Asp Gly Lys Asp Ala Gly Thr Val
 100 105 110
 Lys Phe Val Asn Val Ala Gln Gly Thr Cys Met Glu Ala Phe Lys Asn
 115 120 125
 Gly Val Ile His Asn Thr Cys Asp Asp Asn Ser Leu Ser Gln Glu Phe
 130 135 140
 Gln Leu Leu Pro Ser Thr Asn Gly Asn Val Leu Ile Arg Ser Ser Ala
 145 150 155 160
 Leu Gln Thr Cys Ile Arg Ala Asp Tyr Leu Ser Arg Thr Ile Leu Ser
 165 170 175
 Pro Phe Ala Phe Thr Ile Thr Leu Glu Lys Cys Pro Gly Ala Lys Glu
 180 185 190
 Glu Thr Gln Glu Met Leu Trp Ala Ile Ser Pro Pro Val Arg Ala Ala
 195 200 205

Lys Pro Asn Leu Ile Lys Pro Glu Leu Arg Pro Phe Arg Pro Leu Pro
 210 215 220
 Ile Pro Pro His Asp Lys Pro Asp Gly Met Glu Gly Val
 225 230 235

 <210> 18
 <211> 273
 <212> PRT
 <213> Escherichia coli

 <400> 18
 Met Lys Lys Leu Leu Phe Leu Leu Met Ile Leu Pro Gly Ile Ser Phe
 1 5 10 15
 Ala Asp Leu Ser Asp Phe Lys Val Ala Thr Trp Asn Leu Gln Gly Ser
 20 25 30
 Asn Ala Pro Thr Glu Asn Lys Trp Asn Thr His Val Arg Gln Leu Val
 35 40 45
 Thr Gly Ser Gly Ala Val Asp Ile Leu Met Val Gln Glu Ala Gly Ala
 50 55 60
 Val Pro Ala Ser Ala Thr Leu Thr Glu Arg Glu Phe Ser Thr Pro Gly
 65 70 75 80
 Ile Pro Met Asn Glu Tyr Ile Trp Asn Thr Gly Thr Asn Ser Arg Pro
 85 90 95
 Gln Glu Leu Phe Ile Tyr Phe Ser Arg Val Asp Ala Phe Ala Asn Arg
 100 105 110
 Val Asn Leu Ala Ile Val Ser Asn Arg Arg Ala Asp Glu Val Ile Val
 115 120 125
 Leu Pro Pro Pro Thr Val Val Ser Arg Pro Ile Ile Gly Ile Arg Ile
 130 135 140
 Gly Asn Asp Val Phe Phe Ser Thr His Ala Leu Ala Asn Arg Gly Val
 145 150 155 160
 Asp Ser Gly Ala Ile Val Asn Ser Val Phe Glu Phe Phe Asn Arg Gln
 165 170 175
 Thr Asp Pro Ile Arg Gln Ala Ala Asn Trp Met Ile Ala Gly Asp Phe
 180 185 190
 Asn Arg Ser Pro Ala Thr Leu Phe Ser Thr Leu Glu Pro Gly Ile Arg
 195 200 205
 Asn His Val Asn Ile Ile Ala Pro Pro Asp Pro Thr Gln Ala Ser Gly
 210 215 220
 Gly Val Leu Asp Tyr Ala Val Val Gly Asn Ser Val Ser Phe Val Leu
 225 230 235 240

Pro Leu Leu Arg Ala Ser Leu Leu Phe Gly Leu Leu Arg Gly Gln Ile
 245 250 255

Ala Ser Asp His Phe Pro Val Gly Phe Ile Pro Gly Arg Gly Ala Arg
 260 265 270

Arg

<210> 19
 <211> 190
 <212> PRT
 <213> Escherichia coli

<400> 19
 Met Lys Thr Val Ile Val Phe Phe Val Leu Leu Leu Thr Gly Cys Ala
 1 5 10 15

Ser Glu Pro Ala Asn Gln Arg Asn Leu Leu Thr Gln Phe Val Gly Asn
 20 25 30

Asn Ala Pro Val Asp Pro Glu Pro Ser Pro Val Leu Val Asn Ile Arg
 35 40 45

Asn Val Leu Thr Gly Gly Ile Ile Arg Asn Pro Val Gly Ser Asp Phe
 50 55 60

Asn Val Asn Asn Trp Val Ile Ser Glu Val Lys Thr Asn Asp Leu Asp
 65 70 75 80

Leu Ile Ser Ala Pro Gly Gly His Val Gln Ile Lys Asn Pro Asp Gly
 85 90 95

Asn Glu Cys Phe Ala Ile Leu Asn Gly Gln Leu Ala Val Ala Lys Gln
 100 105 110

Cys Ser Glu Ser Asp Arg Asn Ala Leu Phe Thr Phe Ile Thr Ser Asp
 115 120 125

Thr Gly Ala Val Gln Ile Lys Ser Ile Gly Ser Gly Gln Cys Leu Gly
 130 135 140

Asn Gly Glu Ser Ile Thr Asp Phe Arg Leu Lys Lys Cys Val Asp Asp
 145 150 155 160

Leu Gly Arg Pro Phe Asp Thr Val Pro Pro Gly Leu Leu Trp Met Leu
 165 170 175

Asn Pro Pro Leu Ser Pro Ala Ile Met Ser Pro Leu Thr Ser
 180 185 190

<210> 20
 <211> 258
 <212> PRT
 <213> Escherichia coli

<400> 20
 Met Ala Asn Lys Arg Thr Pro Ile Phe Ile Ala Gly Ile Leu Ile Pro
 1 5 10 15
 Ile Leu Leu Asn Gly Cys Ser Ser Gly Lys Asn Lys Ala Tyr Leu Asp
 20 25 30
 Pro Lys Val Phe Pro Pro Gln Val Glu Gly Gly Pro Thr Val Pro Ser
 35 40 45
 Pro Asp Glu Pro Gly Leu Pro Leu Pro Gly Pro Gly Pro Ala Leu Pro
 50 55 60
 Thr Asn Gly Ala Ile Pro Ile Pro Glu Pro Gly Thr Ala Pro Ala Val
 65 70 75 80
 Ser Leu Met Asn Met Asp Gly Ser Val Leu Thr Met Trp Ser Arg Gly
 85 90 95
 Ala Gly Ser Ser Leu Trp Ala Tyr Tyr Ile Gly Asp Ser Asn Ser Phe
 100 105 110
 Gly Glu Leu Arg Asn Trp Gln Ile Met Pro Gly Thr Arg Pro Asn Thr
 115 120 125
 Ile Gln Phe Arg Asn Val Asp Val Gly Thr Cys Met Thr Ser Phe Pro
 130 135 140
 Gly Phe Lys Gly Gly Val Gln Leu Ser Thr Ala Pro Cys Lys Phe Gly
 145 150 155 160
 Pro Glu Arg Phe Asp Phe Gln Pro Met Ala Thr Arg Asn Gly Asn Tyr
 165 170 175
 Gln Leu Lys Ser Leu Ser Thr Gly Leu Cys Ile Arg Ala Asn Phe Leu
 180 185 190
 Gly Arg Thr Pro Ser Ser Pro Tyr Ala Thr Thr Leu Thr Met Glu Arg
 195 200 205
 Cys Pro Ser Ser Gly Glu Lys Asn Phe Glu Phe Met Trp Ser Ile Ser
 210 215 220
 Glu Pro Leu Arg Pro Ala Leu Ala Thr Ile Ala Lys Pro Glu Ile Arg
 225 230 235 240
 Pro Phe Pro Pro Gln Pro Ile Glu Pro Asp Glu His Ser Thr Gly Gly
 245 250 255
 Glu Gln

<210> 21
<211> 269
<212> PRT
<213> Escherichia coli

<400> 21
 Met Lys Lys Tyr Ile Ile Ser Leu Ile Val Phe Leu Ser Phe Tyr Ala
 1 5 10 15
 Gln Ala Asp Leu Thr Asp Phe Arg Val Ala Thr Trp Asn Leu Gln Gly
 20 25 30
 Ala Ser Ala Thr Thr Glu Ser Lys Trp Asn Ile Asn Val Arg Gln Leu
 35 40 45
 Ile Ser Gly Glu Asn Ala Val Asp Ile Leu Ala Val Gln Glu Ala Gly
 50 55 60
 Ser Pro Pro Ser Thr Ala Val Asp Thr Gly Thr Leu Ile Pro Ser Pro
 65 70 75 80
 Gly Ile Pro Val Arg Glu Leu Ile Trp Asn Leu Ser Thr Asn Ser Arg
 85 90 95
 Pro Gln Gln Val Tyr Ile Tyr Phe Ser Ala Val Asp Ala Leu Gly Gly
 100 105 110
 Arg Val Asn Leu Ala Leu Val Ser Asn Arg Arg Ala Asp Glu Val Phe
 115 120 125
 Val Leu Ser Pro Val Arg Gln Gly Gly Arg Pro Leu Leu Gly Ile Arg
 130 135 140
 Ile Gly Asn Asp Ala Phe Phe Thr Ala His Ala Ile Ala Met Arg Asn
 145 150 155 160
 Asn Asp Ala Pro Ala Leu Val Glu Glu Val Tyr Asn Phe Phe Arg Asp
 165 170 175
 Ser Arg Asp Pro Val His Gln Ala Leu Asn Trp Met Ile Leu Gly Asp
 180 185 190
 Phe Asn Arg Glu Pro Ala Asp Leu Glu Met Asn Leu Thr Val Pro Val
 195 200 205
 Arg Arg Ala Ser Glu Ile Ile Ser Pro Ala Ala Ala Thr Gln Thr Ser
 210 215 220
 Gln Arg Thr Leu Asp Tyr Ala Val Ala Gly Asn Ser Val Ala Phe Arg
 225 230 235 240
 Pro Ser Pro Leu Gln Ala Gly Ile Val Tyr Gly Ala Arg Arg Thr Gln
 245 250 255
 Ile Ser Ser Asp His Phe Pro Val Gly Val Ser Arg Arg
 260 265

<210> 22
<211> 181
<212> PRT
<213> Escherichia coli

<400> 22
 Met Lys Lys Leu Ala Ile Val Phe Thr Met Leu Leu Ile Ala Gly Cys
 1 5 10 15
 Ser Ser Ser Gln Asp Ser Ala Asn Asn Gln Ile Asp Glu Leu Gly Lys
 20 25 30
 Glu Asn Asn Ser Leu Phe Thr Phe Arg Asn Ile Gln Ser Gly Leu Met
 35 40 45
 Ile His Asn Gly Leu His Gln His Gly Arg Glu Thr Ile Gly Trp Glu
 50 55 60
 Ile Val Pro Val Lys Thr Pro Glu Glu Ala Leu Val Thr Asp Gln Ser
 65 70 75 80
 Gly Trp Ile Met Ile Arg Thr Pro Asn Thr Asp Gln Cys Leu Gly Thr
 85 90 95
 Pro Asp Gly Arg Asn Leu Leu Lys Met Thr Cys Asn Ser Thr Ala Lys
 100 105 110
 Lys Thr Leu Phe Ser Leu Ile Pro Ser Thr Thr Gly Ala Val Gln Ile
 115 120 125
 Lys Ser Val Leu Ser Gly Leu Cys Phe Leu Asp Ser Lys Asn Ser Gly
 130 135 140
 Leu Ser Phe Glu Thr Gly Lys Cys Ile Ala Asp Phe Lys Lys Pro Phe
 145 150 155 160
 Glu Val Val Pro Gln Ser His Leu Trp Met Leu Asn Pro Leu Asn Thr
 165 170 175
 Glu Ser Pro Ile Ile
 180

<210> 23
<211> 155
<212> PRT
<213> Escherichia coli

<400> 23
 Glu Asn Lys Trp Asn Thr His Val Arg Gln Leu Val Thr Gly Ser Gly
 1 5 10 15
 Ala Val Asp Ile Leu Met Val Gln Glu Ala Gly Ala Val Pro Ala Ser
 20 25 30
 Ala Thr Leu Thr Glu Arg Glu Phe Ser Thr Pro Gly Ile Pro Met Asn
 35 40 45
 Glu Tyr Ile Trp Asn Thr Gly Thr Asn Ser Arg Pro Gln Glu Leu Phe
 50 55 60
 Ile Tyr Phe Ser Arg Val Asp Ala Phe Ala Asn Arg Val Asn Leu Ala
 65 70 75 80

Ile Val Ser Asn Arg Arg Ala Asp Glu Val Ile Val Leu Pro Pro Pro
 85 90 95
 Thr Val Val Ser Arg Pro Ile Ile Gly Ile Arg Ile Gly Asn Asp Val
 100 105 110
 Phe Phe Ser Thr His Ala Leu Ala Asn Arg Gly Val Asp Ser Gly Ala
 115 120 125
 Ile Val Asn Ser Val Phe Glu Phe Asn Arg Gln Thr Asp Pro Ile
 130 135 140
 Arg Gln Ala Ala Asn Trp Met Ile Ala Gly Asp
 145 150 155

<210> 24
 <211> 609
 <212> PRT
 <213> Homo sapiens

<400> 24
 Met Ser Gly Trp Glu Ser Tyr Tyr Lys Thr Glu Gly Asp Glu Glu Ala
 1 5 10 15
 Glu Glu Glu Gln Glu Glu Asn Leu Glu Ala Ser Gly Asp Tyr Lys Tyr
 20 25 30
 Ser Gly Arg Asp Ser Leu Ile Phe Leu Val Asp Ala Ser Lys Ala Met
 35 40 45
 Phe Glu Ser Gln Ser Glu Asp Glu Leu Thr Pro Phe Asp Met Ser Ile
 50 55 60
 Gln Cys Ile Gln Ser Val Tyr Ile Ser Lys Ile Ile Ser Ser Asp Arg
 65 70 75 80
 Asp Leu Leu Ala Val Val Phe Tyr Gly Thr Glu Lys Asp Lys Asn Ser
 85 90 95
 Val Asn Phe Lys Asn Ile Tyr Val Leu Gln Glu Leu Asp Asn Pro Gly
 100 105 110
 Ala Lys Arg Ile Leu Glu Leu Asp Gln Phe Lys Gly Gln Gln Gly Gln
 115 120 125
 Lys Arg Phe Gln Asp Met Met Gly His Gly Ser Asp Tyr Ser Leu Ser
 130 135 140
 Glu Val Leu Trp Val Cys Ala Asn Leu Phe Ser Asp Val Gln Phe Lys
 145 150 155 160
 Met Ser His Lys Arg Ile Met Leu Phe Thr Asn Glu Asp Asn Pro His
 165 170 175
 Gly Asn Asp Ser Ala Lys Ala Ser Arg Ala Arg Thr Lys Ala Gly Asp
 180 185 190

Leu Arg Asp Thr Gly Ile Phe Leu Asp Leu Met His Leu Lys Lys Pro
 195 200 205
 Gly Gly Phe Asp Ile Ser Leu Phe Tyr Arg Asp Ile Ile Ser Ile Ala
 210 215 220
 Glu Asp Glu Asp Leu Arg Val His Phe Glu Glu Ser Ser Lys Leu Glu
 225 230 235 240
 Asp Leu Leu Arg Lys Val Arg Ala Lys Glu Thr Arg Lys Arg Ala Leu
 245 250 255
 Ser Arg Leu Lys Leu Lys Leu Asn Lys Asp Ile Val Ile Ser Val Gly
 260 265 270
 Ile Tyr Asn Leu Val Gln Lys Ala Leu Lys Pro Pro Pro Ile Lys Leu
 275 280 285
 Tyr Arg Glu Thr Asn Glu Pro Val Lys Thr Lys Thr Arg Thr Phe Asn
 290 295 300
 Thr Ser Thr Gly Gly Leu Leu Pro Ser Asp Thr Lys Arg Ser Gln
 305 310 315 320
 Ile Tyr Gly Ser Arg Gln Ile Ile Leu Glu Lys Glu Glu Thr Glu Glu
 325 330 335
 Leu Lys Arg Phe Asp Asp Pro Gly Leu Met Leu Met Gly Phe Lys Pro
 340 345 350
 Leu Val Leu Leu Lys Lys His His Tyr Leu Arg Pro Ser Leu Phe Val
 355 360 365
 Tyr Pro Glu Glu Ser Leu Val Ile Gly Ser Ser Thr Leu Phe Ser Ala
 370 375 380
 Leu Leu Ile Lys Cys Leu Glu Lys Glu Val Ala Ala Leu Cys Arg Tyr
 385 390 395 400
 Thr Pro Arg Arg Asn Ile Pro Pro Tyr Phe Val Ala Leu Val Pro Gln
 405 410 415
 Glu Glu Glu Leu Asp Asp Gln Lys Ile Gln Val Thr Pro Pro Gly Phe
 420 425 430
 Gln Leu Val Phe Leu Pro Phe Ala Asp Asp Lys Arg Lys Met Pro Phe
 435 440 445
 Thr Glu Lys Ile Met Ala Thr Pro Glu Gln Val Gly Lys Met Lys Ala
 450 455 460
 Ile Val Glu Lys Leu Arg Phe Thr Tyr Arg Ser Asp Ser Phe Glu Asn
 465 470 475 480
 Pro Val Leu Gln Gln His Phe Arg Asn Leu Glu Ala Leu Ala Leu Asp
 485 490 495

Leu Met Glu Pro Glu Gln Ala Val Asp Leu Thr Leu Pro Lys Val Glu
 500 505 510

Ala Met Asn Lys Arg Leu Gly Ser Leu Val Asp Glu Phe Lys Glu Leu
 515 520 525

Val Tyr Pro Pro Asp Tyr Asn Pro Glu Gly Lys Val Thr Lys Arg Lys
 530 535 540

His Asp Asn Glu Gly Ser Gly Ser Lys Arg Pro Lys Val Glu Tyr Ser
 545 550 555 560

Glu Glu Glu Leu Lys Thr His Ile Ser Lys Gly Thr Leu Gly Lys Phe
 565 570 575

Thr Val Pro Met Leu Lys Glu Ala Cys Arg Ala Tyr Gly Leu Lys Ser
 580 585 590

Gly Leu Lys Lys Gln Glu Leu Leu Glu Ala Leu Thr Lys His Phe Gln
 595 600 605

Asp

<210> 25
 <211> 247
 <212> PRT
 <213> Homo sapiens

<400> 25
 Met Gln Ala Pro Arg Glu Leu Ala Val Gly Ile Asp Leu Gly Thr Thr
 1 5 10 15

Tyr Ser Cys Val Gly Val Phe Gln Gln Gly Arg Val Glu Ile Leu Ala
 20 25 30

Asn Asp Gln Gly Asn Arg Thr Thr Pro Ser Tyr Val Ala Phe Thr Asp
 35 40 45

Thr Glu Arg Leu Val Gly Asp Ala Ala Lys Asn Gln Ala Ala Leu Asn
 50 55 60

Pro His Asn Thr Val Phe Asp Ala Lys Arg Leu Ile Gly Arg Lys Phe
 65 70 75 80

Ala Asp Thr Thr Val Gln Ser Asp Met Lys His Trp Pro Phe Lys Val
 85 90 95

Val Ser Gly Gly Lys Pro Lys Val Arg Val Cys Tyr Arg Gly Glu
 100 105 110

Asp Lys Thr Phe Tyr Pro Glu Glu Ile Ser Ser Met Val Leu Thr Lys
 115 120 125

Met Lys Glu Thr Ala Glu Ala Tyr Leu Gly Gln Pro Val Lys His Ala
 130 135 140

Val Ile Thr Val Pro Thr Tyr Phe Ser Asn Ser Gln Arg Gln Ala Thr
145 150 155 160

Lys Asp Ala Gly Ala Ile Ala Gly Leu Lys Val Leu Pro Ile Ile Asn
165 170 175

Glu Ala Thr Ala Ala Ala Ile Ala Tyr Gly Leu Asp Arg Arg Arg Ala
180 185 190

Gly Lys Arg Asn Val Leu Ile Phe Asp Leu Gly Gly Thr Phe Asp
195 200 205

Val Ser Val Leu Thr Ile Asp Ala Gly Val Phe Glu Val Lys Ala Thr
210 215 220

Ala Gly Asp Thr His Leu Gly Gly Glu Asp Phe Asp Asn Arg Leu Val
225 230 235 240

Asn His Phe Met Glu Glu Phe
245